

ENGINEERING DIVISION

APPLICATION

11251

DATE

02/03/05

Permit Evaluation and Emission Calculations

PROCESSING ENGINEER

DENNIS T. JANG

Metcalf Energy Center, LLC ; Plant #12183
7905 Monterey Road, San Jose CA 95139

BACKGROUND

The Metcalf Energy Center, LLC (MEC) is applying for a change of permit conditions that apply to the following permitted sources:

- S-1 Combustion Gas Turbine #1, Westinghouse 501FD, 1,990.5 MMBTU per hour, equipped with dry low-NO_x combustors, abated by A-1 Selective Catalytic Reduction System and A-3 Oxidation Catalyst**
- S-3 Combustion Gas Turbine #2, Westinghouse 501FD, 1,990.5 MMBTU per hour, equipped with dry low-NO_x combustors, abated by A-2 Selective Catalytic Reduction System and A-4 Oxidation Catalyst**

The MEC is under construction and first fire is anticipated for March of 2005. MEC is requesting the following significant changes to the existing permit conditions for the facility. Many of these changes are in conceptual agreement with recent changes made to the permit conditions for the existing Los Medanos Energy Center (LMEC) and Delta Energy Center (DEC). Because the LMEC and DEC employ GE turbines and MEC will utilize Westinghouse turbines the gas turbine start-up emission rates requested by MEC are higher than those at LMEC and DEC.

- Add a definition to the permit conditions for “steam turbine cold start-up” with a maximum duration of 360 minutes in accordance with the HRSG and steam turbine manufacturer’s recommendations. Cold steam turbine start-ups occur after the steam turbine (and by inference, both gas turbines) have been out of operation for more than 72 hours. The permit currently contains a definition of gas turbine start-up with a maximum duration of 180 minutes and does not distinguish between “cold” or “hot” start-ups. This same definition has already been added to the LMEC and DEC permits.
- Add steam turbine cold start-up mass emission rates to condition 21 to reflect the extended duration of cold steam turbine start-up periods which can take up to six hours (360 minutes). Because the turbine must be maintained at low load set points for various durations, the total mass POC, CO, and NO_x emissions for cold steam turbine start-up are greater than the current permit limits. The proposed new NO_x, CO, and POC mass emission limits for cold start-ups are 480 lb NO_x/start-up, 5,028 lb CO/start-up, and 96 lb POC/start-up. The applicant has modeled these new NO_x and CO emission rates and shown that they will not interfere with the attainment or maintenance of any applicable ambient air quality standards for NO_x or CO.
- MEC is also requesting that the existing turbine start-up pound per hour limits for NO_x, CO, and POC be removed since the short-term turbine emission rates may exceed these levels before the SCR and oxidation catalysts reach operating temperature. However, the pound per start-up limits for warm/hot start-ups will remain in place and will not be exceeded. Because the applicant has modeled the 1-hour NO_x and 1-hour CO impacts resulting from turbine emission rates of 480 lb NO_x/hr and 5028 lb CO/hr, the removal of the 80 lb/hr NO_x limit and 902 lb/hr CO limit is acceptable.

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- MEC is requesting the exclusion of gas turbine combustor tuning activities from the BACT emission rate limits governing baseload gas turbine operation. The exclusion would apply to combustor tuning activities that occur after the periodic replacement of combustor parts and after routine maintenance inspections. After the new parts are installed or the turbine is inspected, the turbine combustors must be tuned at various speeds and load levels. During this tuning, the turbine is held at various operating points for various durations. Consequently, the gas turbine does not comply continuously with the CO and NO_x emission limitations while it is being tuned. The combustor tuning periods will not exceed 360 minutes in length and will be subject to the same NO_x, CO, and POC mass emission limits as proposed for the steam turbine cold start-ups. This exclusion has been added to the permits for LMEC and DEC.
- A condition will be added limiting the total number of hours of cold steam turbine start-ups and combustor tuning combined to 30 hours per gas turbine per year. This limit is indicative of the low frequency of these events and will help insure that annual mass emission limits are not exceeded.
- MEC is requesting changes to the permit conditions governing the commissioning period prior to the installation, tuning, and operation of the oxidation catalysts and SCR systems. Specifically, they are requesting an increase in the allowable hourly and daily CO emissions from 930 lb/hr to 5,000 lb/hr and 11,498 lb/day to 20,000 lb/day. This request is based upon Calpine's experience with the commissioning of the Los Medanos Energy Center, Delta Energy Center, and recommendations from Westinghouse, the gas turbine manufacturer.
- Based upon their experience with the first year of operation of the Los Medanos Energy Center and Delta Energy Center, the MEC has requested that the annual limit on NO_x emissions for the first year of operation (including commissioning period emissions) be reduced from 185 tons per year to 150 tons per year. Accordingly, part 10 of the permit conditions will be revised and MEC will receive a banking certificate in the amount of 40.25 tons of POC since they opted to provide POC emission reduction credits to offset a portion of the NO_x emission increases for the MEC when it was originally permitted. This is acceptable since the NO_x emissions from the gas turbines and HRSGs are continuously monitored with CEMs.
- Based upon their experience with the Sutter Energy Center which is equipped with Siemens/Westinghouse gas turbines, MEC is requesting that the gas turbine shutdown emission rate limits be increased from 18 lb/hr to 80 lb/hr for NO_x, 43.8 lb/hr to 902 lb/hr for CO, and from 5 lb/hr to 16 lb/hr for POC. This request is acceptable because it does not trigger PSD modeling and the NO_x and CO emissions from the turbines are continuously monitored at all times, including turbine shutdown. The POC emissions during shutdown will be determined by source testing on an annual basis.
- All source testing will be required within 90 days of start-up and all source test reports submittals will be required within 60 days of the source test date. Based upon the commissioning of the Los Medanos and Delta Energy Centers, these testing and reporting requirements are more realistic and reasonable than the current 60-day testing and 30-day reporting requirements.

The proposed changes will not require any increases in facility daily emissions since the operator will still comply with the permit condition requiring that only one turbine can be in start-up mode at any one time. The proposed changes will not result in any increase in annual mass emission rates since the steam turbine

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cold starts and combustor tuning will occur only a few times per year and will be subject to a combined limit of 30 hours per year per gas turbine. Therefore, no offsets will be required.

However, the increases in gas turbine NO_x and CO start-up emission rates and maximum hourly CO emission rate during commissioning require a revised PSD modeling analysis to determine the 1-hr NO_x and 1-hr & 8-hr CO impacts of those emission increases. Because the PSD impacts analysis for the MEC has been revised, the proposed permit condition changes will be subject to the public notice and public comment requirements of Regulation 2-2-405 and 2-2-406.

Because the proposed permit condition changes involve increases in short-term emission rates, the changes are considered to be a significant permit revision under Title V. However, the initial Title V permit has not yet been issued for the MEC. Therefore, the proposed permit condition changes will be included in the Title V permit when it is issued.

CRITERIA POLLUTANT EMISSION SUMMARY**Annual Average Project Emissions Increase:**

There will no increase in annual emissions as a result of the proposed permit condition changes since they address short-term emission rates only.

Daily Maximum Emissions by Source (lb/day):

There will be no increase in maximum daily NO_x, CO, POC, PM₁₀, or SO₂ emissions from the gas turbines (excluding commissioning period) as a result of the proposed permit conditions changes. Although the gas turbine start-up emission rates will increase when the steam turbine is “cold” (i.e. has been down for more than 72 hours), the existing daily combined mass limits for the gas turbines will not be exceeded since they are based upon the “worst-case” emission scenario when both turbines are started in one day. The owner/operator will manage the start-up of the gas turbines so that the daily limits are not exceeded.

Short-Term Emission Rates:

The proposed changes in gas turbine start-up/combustor tuning emission rates and commissioning emissions are shown in the following table. The emission rates for the cold start-up are double the emission rates for “standard” start-ups since the cold start-up is twice as long as a standard start-up.

Table 1
Current and Proposed Short-Term Emission Rate Limits for S-1 and S-3 Gas Turbines

Operating Mode	NO _x		CO		POC	
	Current	Proposed	Current	Proposed	Current	Proposed
Start-up ¹ (lb/hr)	80	none	838	none	16	none
Start-up ¹ (lb/start-up)	240	240 ³	2,514	2,514 ⁴	48	48
Cold Start-up ² or Combustor Tuning (lb/period)	none	480	none	5,028	none	96
Shutdown	18	80	43.8	902	5	16
Commissioning (lb/hr)	381.2	381.2	930	5,000	none	none
Commissioning (lb/day)	4,805	4,805	11,498	20,000	495	495

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¹maximum duration of 180 minutes²maximum duration of 360 minutes³modeling of turbine emission rate of 480 lb NO_x/hr showed compliance with 1-hr NO_x ambient air quality standard; therefore, de-facto emission rate of 240 lb NO_x/hr is acceptable⁴modeling of turbine emission rate of 5028 lb CO/hr showed compliance with 1-hr CO ambient air quality standard; therefore, de-facto emission rate of 2,514 lb CO/hr is acceptable

Table 2

Current Estimated Maximum Daily Emissions from Gas Turbines and HRSGs (lb/day)

Source (Operating Mode)	NO ₂	CO	POC	PM ₁₀	SO ₂
S-1 Gas Turbine (Start-up)	240	2,514	48	27	3.6
S-1 Gas Turbine & S-2 HRSG (Full load w/Duct Burner Firing and steam injection power augmentation ^a)	307.2	747.6	86.4	192	20.5
S-1 Gas Turbine (Full load w/o Duct Burner Firing ^b)	72	175.1	20	36	4.8
S-1 Gas Turbine (Hot Start-up)	80	902	16	9	1.2
S-3 Gas Turbine (Cold Start-up ^c)	240	2,514	48	27	3.6
S-3 Gas Turbine & S-4 HRSG (Full load w/Duct Burner Firing and steam injection power augmentation ^a)	307.2	747.6	86.4	192	20.5
S-3 Gas Turbine (Full load w/o Duct Burner Firing ^d)	36	87.6	10	18	2.4
S-3 Gas Turbine (Hot Start-up)	80	902	16	9	1.2
Total	1,362.4	8,590	330.8	510	57.8

^abased upon 16 hours of operation at maximum combined heat input of 2,124 MM BTU/hr^bbased upon 4 hours of operation at maximum heat input of 1,990.5 MM BTU/hr^coccurs at beginning of third hour of 24 hour period^dbased upon 2 hours of operation at maximum heat input of 1,990.5 MM BTU/hr

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Table 3

Proposed Estimated Maximum Daily Emissions from Gas Turbines and HRSGs (lb/day)

Source (Operating Mode)	NO ₂	CO	POC	PM ₁₀	SO ₂
S-1 Gas Turbine (Steam Turbine Cold Start-up; 6-hour)	480	5,028	96	54	7.2
S-1 Gas Turbine & S-2 HRSG (Full load w/Duct Burner Firing and steam injection power augmentation ^a)	345.6	505.26	86.4	216	23.04
S-3 Gas Turbine (Start-up ^b ; 3-hr)	240	2,514	48	27	3.6
S-3 Gas Turbine & S-4 HRSG (Full load w/Duct Burner Firing and steam injection power augmentation ^c)	288	421	86.4	180	19.2
Total	1,353.6	8,468	330.8	477	53.04

^abased upon 18 hours of operation at maximum combined heat input of 2,124 MM BTU/hr

^boccurs at beginning of seventh hour of 24 hour period

^cbased upon 15 hours of operation at maximum heat input of 1,990.5 MM BTU/hr

The operating scenarios shown in Tables 2 and 3 are based upon maximum emission rates and assume maximum possible duct burner firing per 24 hour day and are not likely to occur. Consequently, there will no increase in the daily mass emission limits specified in part 24 of the permit conditions.

FACILITY CUMULATIVE INCREASE

(since April 5, 1991)

Because there will no increase in annual emissions as a result of the proposed permit condition changes there will be no change in the facility NSR cumulative increase.

TOXIC RISK SCREENING ANALYSIS

Because the proposed permit condition changes will not result in any increase in annual toxic air contaminant emissions from any source at the MEC facility, no toxic risk screening is required.

BACT ANALYSIS

Because the proposed permit condition changes will not result in any increase in daily or annual emissions from any source at the MEC facility (excluding operation of gas turbines during commissioning period), the BACT provision of NSR does not apply.

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OFFSET ANALYSIS

As discussed earlier, MEC has decided, based upon their commissioning experience with the Los Medanos Energy Center and Delta Energy Center, that the NO_x mass emission limit for the first year of operation can be reduced from 185 tons per year to 150 tons per year. Because the applicant provided sufficient emission reduction credits to offset a NO_x emission increase of 185 tons per year, they are entitled to a refund of $(1.15)(35) = 40.25$ tons per year of offsets. Because MEC submitted POC ERCs to offset the majority of NO_x emission increases under the original permit application 27215, the refunded offsets will be 40.25 tons of POC per year.

PSD AIR QUALITY IMPACT ANALYSIS

When the MEC was originally permitted, the short-term air quality impacts during gas turbine start-up periods was modeled to comply with the District PSD regulations. Under the partial PSD Re-delegation agreement between the District and EPA, the District has primary responsibility for minor modifications to the PSD permit for the MEC. Therefore, the 1-hr NO_x and 1-hr & 8-hr CO impacts of the MEC during start-up must be remodeled to reflect the increases in short-term NO_x and CO emission rates.

TABLE 4
Averaging period emission rates used in modeling analysis (g/s)

Pollutant Source	Commissioning		Startup	
	(1-hour)	(8-hour)	(1-hour)	(8-hour)
NO _x				
Turbine 1	24.02	n/a	60.48	n/a
Turbine 2	24.02		2.42	
Fire Pump				
Emergency Generator				
Cooling Tower				
CO				
Turbine 1	315.0	39.37	633.53	80.08
Turbine 2	315.0	39.38	3.54	14.21
Fire Pump				
Emergency Generator				0.05
Cooling Tower				

As shown above, the NO_x modeling for the commissioning period assumed that each turbine emitted 190.6 lb NO_x/hr. The CO modeling for the commissioning period assumed that each turbine emitted 2,500 lb CO/hr.

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TABLE 5
California and national ambient air quality standards and
ambient air quality levels from the proposed ($\mu\text{g}/\text{m}^3$)

Pollutant	Averaging Time	Maximum Background	Maximum Project impact	Maximum Project impact plus maximum background	California Standards	National Standards
NO _x	1-hour	249	193	442	470	---
CO	1-hour	10,267	11,073	21,340	23,000	40,000

As shown, the maximum project impacts resulting from the increased gas turbine NO_x and CO emission rates during start-up/combustor tuning and commissioning will not result in the exceedance of any applicable state or federal ambient air quality standards.

Pursuant to BAAQMD Regulation 2-2-414.1, the applicant has submitted a modeling analysis that adequately estimates the revised air quality impacts of the MEC project. The applicant's analysis was based on EPA-approved models and was performed in accordance with District Regulation 2-2-414.

Pursuant to Regulation 2-2-414.2, the District has found that the modeling analysis has demonstrated that the proposed emission increases from the MEC facility, in conjunction with all other applicable emissions, will not cause or contribute to a violation of applicable ambient air quality standards for NO₂ and CO or an exceedance of any applicable PSD increment.

Please see appendix A for the complete summary report on the revised PSD air quality impact analysis for the MEC.

PUBLICATION AND PUBLIC COMMENT

The proposed increases in gas turbine NO_x and CO start-up emission rates and maximum hourly CO emission rate during commissioning require a revised PSD modeling analysis to determine the 1-hr NO_x and 1-hr & 8-hr CO impacts of those emission increases. Because the PSD impacts analysis for the MEC has been revised, the proposed permit condition changes will be subject to the public notice and public comment requirements of Regulation 2-2-405 and 2-2-406.

TITLE IV/V OPERATING PERMIT ANALYSIS

Pursuant to Regulation 2-6-226.6, the proposed changes in gas turbine start-up emission rates, the allowance for combustor tuning activities, and related changes in permit conditions constitute significant permit revisions for the purposes of Title V permitting since they trigger case-by-case determinations relative to the air quality impact analysis requirements of PSD. However, the initial Title V permit has not yet been issued for the MEC. Therefore, the changes proposed under this permit will be included with the draft Title V permit when it is offered for public comment.

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FEE SUMMARY

Source	Fee Schedule	Filing Fee	Initial Fee	Late Fee	Permit to Operate Fee	Source Sub-Total
S-1 Gas Turbine #1	B	\$259.00	\$63,733.00	\$0.00	\$0.00	\$63,992.00
S-3 Gas Turbine #3	B	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Grand Total						\$63,992.00
Amount Paid						\$63,992.00

STATEMENT OF COMPLIANCE

S-1 and S-3 Gas Turbines are expected to comply all applicable District, State, and Federal regulations and District permit conditions. As discussed earlier, the proposed increases in gas turbine start-up and commissioning emission rates comply with the air quality impact analysis requirements of the District PSD regulations.

Under the provisions of the Warren-Alquist Act, the California Energy Commission is the lead agency under CEQA for all power plant projects greater than 50 MW in the State of California. Furthermore, the CEC's analysis and certification of a power plant is considered to be equivalent to an EIR. The applicant has submitted a petition to amend the certification for the MEC to include the proposed permit condition changes. The CEC's review of the amendment petition will address CEQA.

The Metcalf Energy Center facility is **not** located within 1000 feet of the outer boundary of a K-12 school and is therefore not subject to the public notification requirements of Regulation 2-1-412.

A Toxics Risk Screening Analysis is not required since the proposed permit condition changes will not result in any increase in worst-case annual toxic air contaminant emissions. TBACT does not apply to this project.

The proposed emission rate changes and permit condition changes do not trigger new reviews of the BACT, Offsets, PSD, NSPS, and NESHAPS regulations.

PERMIT CONDITIONS

Condition #18310

For S-1 & S-2 Gas Turbines, S-3 & S-4 HRSGs, and S-5 Cooling Tower

Definitions:

Clock Hour:	Any continuous 60-minute period beginning on the hour.
Calendar Day:	Any continuous 24-hour period beginning at 12:00 AM or 0000 hours.
Year:	Any consecutive twelve-month period of time
Heat Input:	All heat inputs refer to the heat input at the higher heating value (HHV) of the fuel, in BTU/scf.
Rolling 3-hour period:	Any three-hour period that begins on the hour and does not include start-up or shutdown periods.

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Firing Hours:	Period of time during which fuel is flowing to a unit, measured in fifteen-minute increments.
MM BTU:	million British thermal units
Gas Turbine Start-up Mode:	The lesser of the first 180 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of parts 20(b) and 20(d).
Gas Turbine Shutdown Mode:	The lesser of the 30-minute period immediately prior to the termination of fuel flow to the Gas Turbine or the period of time from non-compliance with any requirement listed in Parts 20(b) through 20(d) until termination of fuel flow to the Gas Turbine.
<u>Gas Turbine Cold Start-up Period:</u>	<u>The lesser of the first 360 minutes of continuous fuel flow to the Gas Turbine after fuel flow is initiated or the period of time from Gas Turbine fuel flow initiation until the Gas Turbine achieves two consecutive CEM data points in compliance with the emission concentration limits of part 20(b), following a shutdown of at least 72 hours</u>
Specified PAHs:	The polycyclic aromatic hydrocarbons listed below shall be considered to Specified PAHs for these permit conditions. Any emission limits for Specified PAHs refer to the sum of the emissions for all six of the following compounds. Benzo[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[a]pyrene Dibenzo[a,h]anthracene Indeno[1,2,3-cd]pyrene
Corrected Concentration:	The concentration of any pollutant (generally NO _x , CO, or NH ₃) corrected to a standard stack gas oxygen concentration. For emission point P-1 (combined exhaust of S-1 Gas Turbine and S-2 HRSG duct burners) and emission point P-2 (combined exhaust of S-3 Gas Turbine and S-4 HRSG duct burners) the standard stack gas oxygen concentration is 15% O ₂ by volume on a dry basis.
Commissioning Activities:	All testing, adjustment, tuning, and calibration activities recommended by the equipment manufacturers and the MEC construction contractor to insure safe and reliable steady state operation of the gas turbines, heat recovery steam generators, steam turbine, <u>air pollution control systems</u> , and associated electrical delivery systems.
Commissioning Period:	The Period shall commence when all mechanical, electrical, and control systems are installed and individual system start-up has been completed, or when a gas turbine is first fired, whichever occurs first. The period shall terminate when the plant has <u>successfully</u> completed performance testing, is available for commercial operation, and has initiated sales to the power exchange. The commissioning period shall not exceed 180 days under any circumstances.
<u>Combustor Tuning Activities:</u>	<u>Any testing, adjustment, tuning, or calibration activities recommended by the gas turbine manufacturer to insure safe and reliable steady-state operation of the gas turbines following replacement of the combustor components, during seasonal tuning events, or at other times when</u>

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recommended by the turbine manufacturer or as necessary to maintain low

emissions performance. This includes, but is not limited to, adjusting the amount of fuel distributed between the combustion turbine's staged fuel systems to simultaneously minimize NO_x and CO production while minimizing combustor dynamics and ensuring combustor stability.

Combustor Tuning Period: The period, not to exceed 360 minutes, when combustor tuning activities are taking place.

Precursor Organic
Compounds (POCs):

Any compound of carbon, excluding methane, ethane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate

CEC CPM:
MEC:

California Energy Commission Compliance Program Manager
Metcalf Energy Center

Conditions for the Commissioning Period

1. The owner/operator of the Metcalf Energy Center (MEC) shall minimize emissions of carbon monoxide and nitrogen oxides from S-1 and S-3 Gas Turbines and S-2 and S-4 Heat Recovery Steam Generators (HRSGs) to the maximum extent possible during the commissioning period. Parts 1 through 12 shall only apply during the commissioning period as defined above. Unless otherwise indicated, Parts 13 through 47 49 shall apply after the commissioning period has ended. (PSD for NO_x and CO)
2. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the S-1 & S-3 Gas Turbine combustors and S-2 & S-4 Heat Recovery Steam Generator duct burners shall be tuned to minimize the emissions of carbon monoxide and nitrogen oxides. (PSD for CO and NO_x)
3. At the earliest feasible opportunity in accordance with the recommendations of the equipment manufacturers and the construction contractor, the A-1 and A-2 SCR Systems and A-3 and A-4 Oxidation Catalysts shall be installed, adjusted, and operated to minimize the emissions of carbon monoxide and nitrogen oxides from S-1 & S-3 Gas Turbines and S-2 & S-4 Heat Recovery Steam Generators. (PSD for CO and NO_x)
4. Coincident with the steady-state operation of A-1 & A-2 SCR Systems and A-3 & A-4 Oxidation Catalysts pursuant to parts 3, 10, 11, and 12, the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) shall comply with the NO_x and CO emission limitations specified in parts 20(a) through 20(d). (BACT, Offsets)
5. The owner/operator of the MEC shall submit a plan to the District Permit Services Division and the CEC CPM at least four weeks prior to first firing of S-1 or S-3 Gas Turbines describing the procedures to be followed during the commissioning of the turbines, HRSGs, and steam turbine. The plan shall include a description of each commissioning activity, the anticipated duration of each activity in hours, and the purpose of the activity. The activities described shall include, but not be limited to, the tuning of the Dry-Low-NO_x combustors, the installation and operation of the required emission control systems, the installation, calibration, and testing of the CO and NO_x continuous emission monitors, and any activities requiring the firing of the Gas Turbines (S-1 & S-3) and HRSGs (S-2 & S-4) without abatement by their respective SCR Systems. Neither Gas Turbine (S-1

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or S-3) shall be fired sooner than 28 days after the District receives the commissioning plan. (PSD for NO_x and CO)

6. During the commissioning period, the owner/operator of the MEC shall demonstrate compliance with parts 8 through 10 through the use of properly operated and maintained continuous emission monitors and data recorders for the following parameters:

firing hours
fuel flow rates
stack gas nitrogen oxide emission concentrations,
stack gas carbon monoxide emission concentrations
stack gas oxygen concentrations.

The monitored parameters shall be recorded at least once every 15 minutes (excluding normal calibration periods or when the monitored source is not in operation) for the Gas Turbines (S-1 & S-3) and HRSGs (S-2 & S-4). The owner/operator shall use District-approved methods to calculate heat input rates, nitrogen dioxide mass emission rates, carbon monoxide mass emission rates, and NO_x and CO emission concentrations, summarized for each clock hour and each calendar day. All records shall be retained on site for at least 5 years from the date of entry and made available to District personnel upon request. (9-9-501, BACT, Offsets)

7. The District-approved continuous monitors specified in part 6 shall be installed, calibrated, and operational prior to first firing of the Gas Turbines (S-1 & S-3) and Heat Recovery Steam Generators (S-2 & S-4). After first firing of the turbines, the detection range of these continuous emission monitors shall be adjusted as necessary to accurately measure the resulting range of CO and NO_x emission concentrations. The type, specifications, and location of these monitors shall be subject to District review and approval. (9-9-501, BACT, Offsets)
8. The total number of firing hours of S-1 Gas Turbine and S-2 Heat Recovery Steam Generator without abatement of nitrogen oxide emissions by A-1 SCR System and/or without abatement of carbon monoxide emissions by A-3 Oxidation Catalyst shall not exceed 300 hours during the commissioning period. Such operation of S-1 Gas Turbine and S-2 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system in place. Upon completion of these activities, the owner/operator shall provide written notice to the District Permit Services and Enforcement Divisions and the unused balance of the 300 firing hours without abatement shall expire. (Offsets)
9. The total number of firing hours of S-3 Gas Turbine and S-4 Heat Recovery Steam Generator without abatement of nitrogen oxide emissions by A-3 SCR System and/or without abatement of carbon monoxide emissions by A-4 Oxidation Catalyst shall not exceed 300 hours during the commissioning period. Such operation of S-3 Gas Turbine and S-4 HRSG without abatement shall be limited to discrete commissioning activities that can only be properly executed without the SCR system in place. Upon completion of these activities, the owner/operator shall provide written notice to the District Permit Services and Enforcement Divisions and the unused balance of the 300 firing hours without abatement shall expire. (Offsets)
10. The total mass emissions of nitrogen oxides, carbon monoxide, precursor organic compounds, PM₁₀, and sulfur dioxide that are emitted by the Gas Turbines (S-1 & S-3) and Heat Recovery Steam Generators (S-2 & S-4) during the commissioning period shall accrue towards the consecutive twelve-month emission limitations specified in part 25, except that total, cumulative NO_x mass emissions from S-1, S-2, S-3, and S-4 shall not exceed ~~185~~ 150 tons during any consecutive twelve-

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month period which includes a portion of the Commissioning Period. (Offsets)

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11. Combined pollutant mass emissions from the Gas Turbines (S-1 & S-3) and Heat Recovery Steam Generators (S-2 & S-4) shall not exceed the following limits during the commissioning period. These emission limits shall include emissions resulting from the start-up and shutdown of the Gas Turbines (S-1 & S-3).

NO _x (as NO ₂)	4805 pounds per calendar day	381.2 pounds per hour
CO	11,498 <u>20,000</u> pounds per calendar day	930 <u>5000</u> pounds per hour
POC (as CH ₄)	495 pounds per calendar day	
PM ₁₀	468 pounds per calendar day	
SO ₂	42 pounds per calendar day	
(PSD for NO _x and CO)		

12. Prior to the end of the Commissioning Period and not later than ~~120~~ 90 days after commencement of the commissioning period, the Owner/Operator shall conduct a District and CEC approved source test using external continuous emission monitors to determine compliance with part 21. The source test shall determine NO_x, CO, and POC emissions during start-up and shutdown of the gas turbines. The POC emissions shall be analyzed for methane and ethane to account for the presence of unburned natural gas. The source test shall include a minimum of three start-up and three shutdown periods. Twenty working days before the execution of the source tests, the Owner/Operator shall submit to the District and the CEC Compliance Program Manager (CPM) a detailed source test plan designed to satisfy the requirements of this condition. The District and the CEC CPM will notify the Owner/Operator of any necessary modifications to the plan within 20 working days of receipt of the plan; otherwise, the plan shall be deemed approved. The Owner/Operator shall incorporate the District and CEC CPM comments into the test plan. The Owner/Operator shall notify the District and the CEC CPM within seven (7) working days prior to the planned source testing date. Source test results shall be submitted to the District and the CEC CPM within ~~30~~ 60 days of the source testing date. (PSD for NO_x and CO offsets)

Conditions for the Gas Turbines (S-1 & S-3) and the Heat Recovery Steam Generators (HRSG; S-2 & S-4)

13. The Gas Turbines (S-1 and S-3) and HRSG Duct Burners (S-2 and S-4) shall be fired exclusively on natural gas with a maximum sulfur content of 1 grain per 100 standard cubic feet. (BACT for SO₂ and PM₁₀)
14. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed 2,124 MM BTU (HHV) per hour, averaged over any rolling 3-hour period. (PSD for NO_x)
15. The combined heat input rate to each power train consisting of a Gas Turbine and its associated HRSG (S-1 & S-2 and S-3 & S-4) shall not exceed 49,908 MM BTU (HHV) per calendar day. (PSD for PM₁₀)
16. The combined cumulative heat input rate for the Gas Turbines (S-1 & S-3) and the HRSGs (S-2 & S-4) shall not exceed 35,274,060 MM BTU (HHV) per year. (Offsets)
17. The HRSG duct burners (S-2 and S-4) shall not be fired unless its associated Gas Turbine (S-1 and S-3, respectively) is in operation. (BACT for NO_x)

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18. S-1 Gas Turbine and S-2 HRSG shall be abated by the properly operated and properly maintained A-1 Selective Catalytic Reduction (SCR) System and A-3 Oxidation Catalyst whenever fuel is combusted at those sources and the A-1 catalyst bed has reached minimum operating temperature. (BACT for NO_x)
19. S-3 Gas Turbine and S-4 HRSG shall be abated by the properly operated and properly maintained A-2 Selective Catalytic Reduction (SCR) System and A-4 Oxidation Catalyst whenever fuel is combusted at those sources and the A-2 catalyst bed has reached minimum operating temperature. (BACT for NO_x)
20. The Gas Turbines (S-1 & S-3) and HRSGs (S-2 & S-4) shall comply with requirements (a) through (h) under all operating scenarios, including duct burner firing mode and steam injection power augmentation mode. Requirements (a) through (h) do not apply during a gas turbine start-up, a gas turbine or shutdown, a gas turbine cold start-up, or a combustor tuning period. (BACT, PSD, Toxic Risk Management Policy)
 - (a) Nitrogen oxide mass emissions (calculated as NO₂) at P-1 (the combined exhaust point for the S-1 Gas Turbine and the S-2 HRSG after abatement by A-1 SCR System) shall not exceed 19.2 pounds per hour or 0.00904 lb/MM BTU (HHV) of natural gas fired. Nitrogen oxide mass emissions (calculated as NO₂) at P-2 (the combined exhaust point for the S-3 Gas Turbine and the S-4 HRSG after abatement by A-3 SCR System) shall not exceed 19.2 pounds per hour or 0.00904 lb/MM BTU (HHV) of natural gas fired. (PSD for NO_x)
 - (b) The nitrogen oxide emission concentration at emission points P-1 and P-2 each shall not exceed 2.5 ppmv, on a dry basis, corrected to 15% O₂, averaged over any 1-hour period. (BACT for NO_x)
 - (c) Carbon monoxide mass emissions at P-1 and P-2 each shall not exceed 28.07 pounds per hour, averaged over any rolling 3-hour period. (PSD for CO)
 - (d) When the heat input to a combustion turbine exceeds 1700 MM BTU/hr (HHV), the carbon monoxide emission concentration at P-1 and P-2 each shall not exceed 6.0 ppmv, on a dry basis, corrected to 15% O₂, and the carbon monoxide mass emission rate at P-1 and P-2 each shall not exceed 0.0132 lb/MM BTU of natural gas fired, averaged over any rolling 3-hour period. If compliance source test results and continuous emission monitoring data indicate that a lower CO emission concentration level can be achieved on a consistent basis (with a suitable compliance margin subject to APCO review and approval) over the entire range of turbine operating conditions, including duct firing and power steam augmentation operations, and over the entire range of ambient conditions, the District will reduce this limit to a level not lower than 4.0 ppmv, on a dry basis, corrected to 15% O₂. If this limit is reduced, the corresponding mass emission rate limit specified in part 20(c) shall also be modified to reflect this reduction. (BACT for CO)
 - (e) Ammonia (NH₃) emission concentrations at P-1 and P-2 each shall not exceed 5 ppmv, on a dry basis, corrected to 15% O₂, averaged over any rolling 3-hour period. This ammonia emission concentration shall be verified by the continuous recording of the ammonia injection rate to A-1 and A-2 SCR Systems a District-approved ammonia slip calculation method. The correlation between the gas turbine and HRSG heat input rates, A-1 and A-2 SCR System ammonia injection rates, and corresponding ammonia emission concentration at emission points P-1 and P-2 factors to be used in the calculation method shall be determined in accordance with permit condition 30. (TRMP for NH₃)

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- (f) Precursor organic compound (POC) mass emissions (as CH₄) at P-1 and P-2 each shall not exceed 2.7 pounds per hour or 0.00126 lb/MM BTU of natural gas fired. (BACT)
- (g) Sulfur dioxide (SO₂) mass emissions at P-1 and P-2 each shall not exceed 1.28 pounds per hour or 0.0006 lb/MM BTU of natural gas fired. (BACT)
- (h) Particulate matter (PM₁₀) mass emissions at P-1 and P-2 each shall not exceed 9 pounds per hour or 0.00452 lb PM₁₀/MM BTU of natural gas fired when HRSG duct burners are not in operation. Particulate matter (PM₁₀) mass emissions at P-1 and P-2 each shall not exceed 12 pounds per hour or 0.00565 lb PM₁₀/MM BTU of natural gas fired when HRSG duct burners are in operation. (BACT)
21. The regulated air pollutant mass emission rates from each of the Gas Turbines (S-1 and S-3) during a start-up, combustor tuning period, or a shutdown shall not exceed the limits established below. (PSD)
- | | Start-Up
(lb/start-up) | Start-Up
(lb/hr) | <u>Cold Start-up</u>
<u>Or Combustor</u>
<u>Tuning (lb/period)</u> | Shutdown
(lb/shutdown) |
|---|---------------------------|--------------------------------|--|----------------------------|
| Oxides of Nitrogen (as NO ₂) | 240 | 80 | <u>480</u> | 18 <u>80</u> |
| Carbon Monoxide (CO) | 2,514 | 902 | <u>5,028</u> | 43.8 <u>902</u> |
| Precursor Organic Compounds (as CH ₄) | 48 | 16 | <u>96</u> | 5 <u>16</u> |
22. Not more than one of the Gas Turbines (S-1 and S-3) shall ~~not~~ be in start-up mode or undergoing combustor tuning at any one time. simultaneously. (PSD)
23. The heat recovery steam generators (S-2 & S-4) and associated ducting shall be designed and constructed such that an oxidation catalyst can be readily installed and properly operated if deemed necessary by the APCO to insure compliance with the CO emission rate limitations of parts 20(c) and 20(d). (BACT)
24. Total combined emissions from the Gas Turbines and HRSGs (S-1, S-2, S-3, and S-4), including emissions generated during Gas Turbine start-ups, gas turbine and shutdowns, and Gas Turbine combustor tuning activities shall not exceed the following limits during any calendar day:
- (a) 1,362.6 pounds of NO_x (as NO₂) per day (CEQA)
 - (b) 7,891.1 pounds of CO per day (PSD)
 - (c) 230.2 pounds of POC (as CH₄) per day (CEQA)
 - (d) 510 pounds of PM₁₀ per day (PSD)
 - (e) 57.9 pounds of SO₂ per day (BACT)
25. Cumulative combined emissions from the Gas Turbines and HRSGs (S-1, S-2, S-3, and S-4), including emissions generated during gas turbine start-ups, gas turbine and shutdowns, and Gas Turbine combustor tuning activities shall not exceed the following limits during any consecutive twelve-month period:
- (a) 123.4 tons of NO_x (as NO₂) per year (Offsets)
 - (b) 588 tons of CO per year (Cumulative Increase, PSD)
 - (c) 28 tons of POC (as CH₄) per year (Offsets)
 - (d) 83.34 tons of PM₁₀ per year (Offsets)
 - (e) 10.6 tons of SO₂ per year (Cumulative Increase)

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26. The maximum projected annual toxic air contaminant emissions (per part 29) from the Gas Turbines and HRSGs combined (S-1, S-2, S-3, and S-4) shall not exceed the following limits:

formaldehyde	3,796 pounds per year
benzene	480 pounds of per year
Specified polycyclic aromatic hydrocarbons (PAHs)	22.8 pounds of per year

unless the following requirement is satisfied:

The owner/operator shall perform a health risk assessment using the emission rates determined by source test and the most current Bay Area Air Quality Management District approved procedures and unit risk factors in effect at the time of the analysis. This risk analysis shall be submitted to the District and the CEC CPM within 60 days of the source test date. The owner/operator may request that the District and the CEC CPM revise the carcinogenic compound emission limits specified above. If the owner/operator demonstrates to the satisfaction of the APCO that these revised emission limits will result in a cancer risk of not more than 1.0 in one million, the District and the CEC CPM may, at their discretion, adjust the carcinogenic compound emission limits listed above. (TRMP)

27. The owner/operator shall demonstrate compliance with parts 14 through 17, 20(a) through 20(d), 21, 22, 24(a), 24(b), 25(a), and 25(b) by using properly operated and maintained continuous monitors (during all hours of operation including equipment Start-up and Shutdown and combustor tuning periods) for all of the following parameters:

- Firing Hours and Fuel Flow Rates for each of the following sources: S-1 & S-2 combined and S-3 & S-4 combined.
- Oxygen (O₂) Concentrations, Nitrogen Oxides (NO_x) Concentrations, and Carbon Monoxide (CO) Concentrations at each of the following exhaust points: P-1 and P-2.
- Ammonia injection rate at A-1 and A-2 SCR Systems
- Steam injection rate at S-1 & S-3 Gas Turbine Combustors

The owner/operator shall record all of the above parameters every 15 minutes (excluding normal calibration periods) and shall summarize all of the above parameters for each clock hour. For each calendar day, the owner/operator shall calculate and record the total firing hours, the average hourly fuel flow rates, and pollutant emission concentrations.

The owner/operator shall use the parameters measured above and District-approved calculation methods to calculate the following parameters:

- Heat Input Rate for each of the following sources: S-1 & S-2 combined and S-3 & S-4 combined.
- Corrected NO_x concentrations, NO_x mass emissions (as NO₂), corrected CO concentrations, and CO mass emissions at each of the following exhaust points: P-1 and P-2.

For each source, source grouping, or exhaust point, the owner/operator shall record the parameters specified in parts 27(e) and 27(f) at least once every 15 minutes (excluding normal calibration periods). As specified below, the owner/operator shall calculate and record the following data:

- total Heat Input Rate for every clock hour and the average hourly Heat Input Rate for every rolling 3-hour period.
- on an hourly basis, the cumulative total Heat Input Rate for each calendar day for the following: each Gas Turbine and associated HRSG combined and all four sources (S-1, S-2, S-3, and S-4) combined.

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- (i) the average NO_x mass emissions (as NO₂), CO mass emissions, and corrected NO_x and CO emission concentrations for every clock hour and for every rolling 3-hour period.
 - (j) on an hourly basis, the cumulative total NO_x mass emissions (as NO₂) and the cumulative total CO mass emissions, for each calendar day for the following: each Gas Turbine and associated HRSG combined, and all four sources (S-1, S-2, S-3, and S-4) combined.
 - (k) For each calendar day, the average hourly Heat Input Rates, Corrected NO_x emission concentrations, NO_x mass emissions (as NO₂), corrected CO emission concentrations, and CO mass emissions for each Gas Turbine and associated HRSG combined.
 - (l) on a daily basis, the cumulative total NO_x mass emissions (as NO₂) and cumulative total CO mass emissions, for the previous consecutive twelve-month period for all four sources (S-1, S-2, S-3, and S-4) combined.
- (1-520.1, 9-9-501, BACT, Offsets, NSPS, PSD, Cumulative Increase)
28. To demonstrate compliance with parts 20(f), 20(g), 20(h), 21, 24(c) through 24(e), and 25(c) through 25(e), the owner/operator shall calculate and record on a daily basis, the Precursor Organic Compound (POC) mass emissions, Fine Particulate Matter (PM₁₀) mass emissions (including condensable particulate matter), and Sulfur Dioxide (SO₂) mass emissions from each power train. The owner/operator shall use the actual Heat Input Rates calculated pursuant to part 27, actual Gas Turbine Start-up Times, actual Gas Turbine Shutdown Times, actual gas turbine combustor tuning times, and CEC and District-approved emission factors to calculate these emissions. The calculated emissions shall be presented as follows:
- (a) For each calendar day, POC, PM₁₀, and SO₂ emissions shall be summarized for: each power train (Gas Turbine and its respective HRSG combined) and all four sources (S-1, S-2, S-3, and S-4) combined.
 - (b) on a daily basis, the cumulative total POC, PM₁₀, and SO₂ mass emissions, for each year for all four sources (S-1, S-2, S-3, and S-4) combined.
- (Offsets, PSD, Cumulative Increase)
29. To demonstrate compliance with Part 26, the owner/operator shall calculate and record on an annual basis the maximum projected annual emissions of: Formaldehyde, Benzene, and Specified PAH's. Maximum projected annual emissions shall be calculated using the maximum Heat Input Rate of 35,274,060 MM BTU/year and the highest emission factor (pounds of pollutant per MM BTU of Heat Input) determined by any source test of the S-1 & S-3 Gas Turbines and/or S-2 & S-4 Heat Recovery Steam Generators. If the highest emission factor for a given pollutant occurs during minimum-load turbine operation, a reduced annual heat input rate may be utilized to calculate the maximum projected annual emissions to reflect the reduced heat input during gas turbine start-up and minimum-load operation. The reduced annual heat input rate shall be subject to the review and approval of the District. (TRMP)
30. Within ~~60~~ 90 days of start-up of the MEC, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 to determine the ~~corrected ammonia (NH₃) emission concentration~~ establish the factors to be used to determine compliance with part 20(e). ~~The source test shall determine the correlation between the heat input rates of the gas turbine and associated HRSG, A-1 or A-2 SCR System ammonia injection rate, and the corresponding NH₃ emission concentration at emission point P-1 or P-2.~~ The source test shall be conducted over the expected operating range of the turbine and HRSG (including, but not limited to, minimum and full load, and steam injection power augmentation mode) to establish the ~~range of ammonia injection rates necessary to achieve NO_x emission reductions while maintaining correction factors that will be used to calculate~~ ammonia slip

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levels. This source testing shall be repeated on an annual basis thereafter. Continuing compliance with part 20(e) shall be demonstrated through calculations of corrected ammonia concentrations based upon the source test correlation and continuous records of ammonia injection rate District-approved calculation method. (TRMP)

31. Within ~~60~~ 90 days of start-up of the MEC and on an annual basis thereafter, the owner/operator shall conduct a District-approved source test on exhaust points P-1 and P-2 while each Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum load (including steam injection power augmentation mode) to determine compliance with Parts 20(a), (b), (c), (d), (f), (g), and (h), while each Gas Turbine and associated Heat Recovery Steam Generator are operating at minimum load to determine compliance with Parts 20(c) and (d), and to verify the accuracy of the continuous emission monitors required in part 29. The owner/operator shall test for (as a minimum): water content, stack gas flow rate, oxygen concentration, precursor organic compound concentration and mass emissions, nitrogen oxide concentration and mass emissions (as NO₂), carbon monoxide concentration and mass emissions, sulfur dioxide concentration and mass emissions, methane, ethane, and particulate matter (PM₁₀) emissions including condensable particulate matter. (BACT, offsets)
32. The owner/operator shall obtain approval for all source test procedures from the District's Source Test Section and the CEC CPM prior to conducting any tests. The owner/operator shall comply with all applicable testing requirements for continuous emission monitors as specified in Volume V of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section and the CEC CPM in writing of the source test protocols and projected test dates at least 7 days prior to the testing date(s). As indicated above, the Owner/Operator shall measure the contribution of condensable PM (back half) to the total PM₁₀ emissions. However, the Owner/Operator may propose alternative measuring techniques to measure condensable PM such as the use of a dilution tunnel or other appropriate method used to capture semi-volatile organic compounds. Source test results shall be submitted to the District and the CEC CPM within 60 days of conducting the tests. (BACT)
33. Within ~~60~~ 90 days of start-up of the MEC and on a ~~an~~ biennial basis (once every two years) thereafter, the owner/operator shall conduct a District-approved source test on exhaust point P-1 or P-2 while the Gas Turbine and associated Heat Recovery Steam Generator are operating at maximum allowable operating rates to demonstrate compliance with Part 26. The gas turbine shall also be tested at minimum load. If three consecutive biennial source tests demonstrate that the annual emission rates calculated pursuant to part 29 for any of the compounds listed below are less than the BAAQMD Toxic Risk Management Policy trigger levels shown, then the owner/operator may discontinue future testing for that pollutant:

Benzene	≤	26.8 pounds/year
Formaldehyde	≤	132 pounds/year
Specified PAH's	≤	0.18 pounds/year

(TRMP)

34. The owner/operator of the MEC shall submit all reports (including, but not limited to monthly CEM reports, monitor breakdown reports, emission excess reports, and equipment breakdown reports) as required by District Rules or Regulations and in accordance with all procedures and time limits specified in the Rule, Regulation, Manual of Procedures, or Enforcement Division Policies & Procedures Manual. Data from any source test required by this permit shall be submitted to the District within 30 days of the testing date, unless otherwise indicated. (Regulation 2-6-502)

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35. The owner/operator of the MEC shall maintain all records and reports on site for a minimum of 5 years. These records shall include but are not limited to: continuous monitoring records (firing hours, fuel flows, emission rates, monitor excesses, and breakdowns), source test and analytical records, natural gas sulfur content analysis results, emission calculation records, records of plant upsets and related incidents. The owner/operator shall make all records and reports available to District and the CEC CPM staff upon request. (Regulation 2-6-501)
36. The owner/operator of the MEC shall notify the District and the CEC CPM of any violations of these permit conditions. Notification shall be submitted in a timely manner, in accordance with all applicable District Rules, Regulations, and the Manual of Procedures. Notwithstanding the notification and reporting requirements given in any District Rule, Regulation, or the Manual of Procedures, the owner/operator shall submit written notification (facsimile is acceptable) to the Enforcement Division within 96 hours of the violation of any permit condition. (Regulation 2-1-403)
37. The stack height of emission points P-1 and P-2 shall each be at least 145 feet above grade level at the stack base. (PSD, TRMP)
38. The Owner/Operator of MEC shall provide adequate stack sampling ports and platforms to enable the performance of source testing. The location and configuration of the stack sampling ports shall be subject to BAAQMD review and approval. (Regulation 1-501)
39. Within 180 days of the issuance of the Authority to Construct for the MEC, the Owner/Operator shall contact the BAAQMD Technical Services Division regarding requirements for the continuous emission monitors, sampling ports, platforms, and source tests required by parts 27, 30, 31, 33, and 47. All source testing and monitoring shall be conducted in accordance with the BAAQMD Manual of Procedures. (Regulation 1-501)
40. Prior to the issuance of the BAAQMD Authority to Construct for the Metcalf Energy Center, the Owner/Operator shall demonstrate that valid emission reduction credits in the amount of ~~212.75~~ 172.5 tons/year of Nitrogen Oxides and 28 tons/year of Precursor Organic Compounds or equivalent (as defined by District Regulations 2-2-302.1 and 2-2-302.2) are under their control through enforceable contracts, option to purchase agreements, or equivalent binding legal documents. (Offsets)
41. Prior to the start of construction of the Metcalf Energy Center, the Owner/Operator shall provide to the District valid emission reduction credit banking certificates in the amount of 212.75 tons/year of Nitrogen Oxides and 28 tons/year of Precursor Organic Compounds or equivalent as defined by District Regulations 2-2-302.1 and 2-2-302.2. (Offsets, CEC)
42. Pursuant to BAAQMD Regulation 2, Rule 6, section 404.1, the owner/operator of the MEC shall submit an application to the BAAQMD for a major facility review permit within 12 months of the issuance of the PSD permit for the MEC. (Regulation 2-6-404.1)
43. Pursuant to 40 CFR Part 72.30(b)(2)(ii) of the Federal Acid Rain Program, the owner/operator of the Metcalf Energy Center shall submit an application for a Title IV operating permit to the BAAQMD. Operation of any of the gas turbines (S-1 & S-3) or HRSGs (S-2 & S-4) without a Title IV operating permit may not occur sooner than 24 months after the application is received by the BAAQMD. (Regulation 2, Rule 7)

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44. The owner/operator shall comply with the continuous emission monitoring requirements of 40 CFR Part 75. (Regulation 2, Rule 7)
45. The owner/operator shall take monthly samples of the natural gas combusted at the MEC. The samples shall be analyzed for sulfur content using District-approved laboratory methods. The sulfur content test results shall be retained on site for a minimum of five years from the test date and shall be utilized to satisfy the requirements of 40 CFR Part 60, subpart GG. (cumulative increase)
46. The owner/operator shall properly install the cooling towers and shall maintain them to minimize drift losses. The cooling towers shall be equipped with high-efficiency mist eliminators with a maximum guaranteed drift rate of 0.0005%. The maximum total dissolved solids (TDS) measured at the base of the cooling towers or at the point of return to the wastewater facility shall not be higher than 5,438 ppmw (mg/l). The owner/operator shall sample the water at least once per day. (PSD)
47. The owner/operator shall perform a visual inspection of the cooling tower drift eliminators at least once per calendar year, and repair or replace any drift eliminator components which are broken or missing. Prior to the initial operation of the Metcalf Energy Center, the owner/operator shall have the cooling tower vendor's field representative inspect the cooling tower drift eliminators and certify that the installation was performed in a satisfactory manner. Within ~~60~~ 90 days of the initial operation of the cooling tower, the owner/operator shall perform an initial performance source test to determine the PM₁₀ emission rate from the cooling tower to verify compliance with the vendor-guaranteed drift rate specified in part 46. The CPM may, in years 5 and 15 of cooling tower operation, require the owner/operator to perform source tests to verify continued compliance with the vendor-guaranteed drift rate specified in part 46. (PSD)
48. The total number of hours during which the Gas Turbines (S-1 and S-3) may be operated in cold start-up mode or may undergo combustor tuning shall not exceed 30 hours per year for each gas turbine. (cumulative increase)
49. To demonstrate compliance with condition 48, the owner/operator shall record the start time, end time, and duration of each gas turbine cold start-up and each combustor tuning period. On an annual basis, the owner/operator shall record the total number of hours during which each gas turbine (S-1 and S-3) operated in cold start-up mode or combustor tuning mode for each calendar year. (cumulative increase)

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RECOMMENDATION

Issue a **Change of Conditions Letter** for the following sources:

- S-1 Combustion Gas Turbine #1, Westinghouse 501FD, 1,990.5 MMBTU per hour, equipped with dry low-NO_x Combustors, abated by A-1 Selective Catalytic Reduction System and A-3 Oxidation Catalyst
- S-3 Combustion Gas Turbine #2, Westinghouse 501FD, 1,990.5 MMBTU per hour, equipped with dry low-NO_x Combustors, abated by A-2 Selective Catalytic Reduction System and A-4 Oxidation Catalyst

Issue a **Banking Certificate** in the amount of 40.25 tons per year of POC to Calpine Corporation (originally from certificate 743).

Air Quality Engineer II

Date

Appendix A

Summary of PSD Air Quality Impact Analysis

SUMMARY OF AIR QUALITY IMPACT ANALYSIS FOR THE METCALF ENERGY CENTER PROPOSED PERMIT CHANGES

January 11, 2005

BACKGROUND

Calpine Corporation and Bechtel Enterprises Holdings, Inc. originally submitted a permit application (# 27215) for a proposed 600-MW combined cycle power plant, the Metcalf Energy Center in February 2000. The facility is to be composed of two natural gas-fired turbines with heat recovery steam generators, one steam turbine and supplemental burners (duct burners), a cooling tower, plus an emergency generator and fire pump engine. An air quality modeling impact analysis was performed for the facility in April 2000 and it was determined that the air quality impacts from the proposed project would not interfere with the attainment or maintenance of applicable ambient air quality standards for NO₂, CO and PM₁₀. Based on operating experience at other facilities, the owners, now the Metcalf Energy Center, LLC, have requested changes in the permit related to turbine/heat recovery steam generator commissioning, cold steam turbine startup and gas turbine tuning. The requested changes, as outlined in the November 2004 permit application and the December 23, 2004 revised modeling analysis, apply only to the short term CO and NO₂ emission rates during commissioning and startup. The applicant is not proposing to change any of the previously permitted daily or long-term annual emission limits. As a result, only impacts for criteria pollutants with short term averages, one- and eight-hour CO and one-hour NO₂ concentrations, are presented.

AIR QUALITY IMPACT ANALYSIS SUMMARY

The required contents of an air quality impact analysis are specified in Section 414 of Regulation 2 Rule 2. According to subsection 414.1, if the maximum air quality impacts of a new or modified stationary source do not exceed significant levels for air quality impacts, as defined in Section 2-2-233, no further analysis is required. (Consistent with EPA regulations, it is assumed that emission increases will not interfere with the attainment or maintenance of AAQS, or cause an exceedance of a PSD increment if the resulting maximum air quality impacts are less than specified significant levels). If the maximum impact for a particular pollutant is predicted to exceed the significant impact level, a full impact analysis is required involving estimation of background pollutant concentrations and, if applicable, a PSD increment consumption analysis.

Air Quality Modeling Methodology

Maximum ambient concentrations of NO_x and CO were estimated for various plume dispersion scenarios using established modeling procedures. The plume dispersion scenarios addressed include simple terrain impacts (for receptors located below stack height), complex terrain impacts (for receptors located at or above stack height), impacts due to building downwash, and impacts due to inversion breakup. Because the facility is not within 3 km of a shoreline of a large body of water, shoreline fumigations impacts were not modeled.

Emissions from the turbines will be exhausted from two 145 foot exhaust stacks. The project also includes a cooling tower (comprised of 10 cells) with a release height of 64 feet. Table II contains the emission rates used in the turbine commissioning and turbine startup modeling scenarios. Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation. It is assumed both turbines are being commissioned simultaneously with each emitting half of the allowable emissions during the averaging period. During turbine startup for the one-hour averaging period, only one gas turbine will be in startup mode at a time, and only one gas turbine will be supporting a steam turbine cold startup or gas combustor tuning operation at a time. For the eight-hour averaging period, one turbine initiates a six-hour steam turbine cold startup or gas turbine combustor tuning period at the beginning of the eight-hour period and the second turbine initiates a warm startup or combustor tuning period during the last two hours of the eight-hour period.

The applicant used the EPA model ISCST3. The model was run using 1993 meteorological data collected by IBM at its facility about three miles northwest of the proposed project site. Because the exhaust stacks are less than Good Engineering Practice (GEP) stack height, ambient impacts due to building downwash were evaluated. Because complex terrain was located nearby, complex terrain impacts were considered. The Ozone Limiting Method was used to convert one-hour NO_x impacts into one-hour NO₂ impacts.

Table II
Averaging period emission rates used in modeling analysis (g/s)

Pollutant Source	Commissioning ¹		Startup ²	
	(1-hour)	(8-hour)	(1-hour)	(8-hour)
NO _x				
Turbine 1	24.02	n/a	60.48	n/a
Turbine 2	24.02		2.42	
Fire Pump				
Emergency Generator				
Cooling Tower				
CO				
Turbine 1	315.0	39.37	633.53	80.08
Turbine 2	315.0	39.38	3.54	14.21
Fire Pump				
Emergency Generator				0.05
Cooling Tower				

¹Commissioning is the original startup of the turbines and only occurs during the initial operation of the equipment after installation.

²Startup is the beginning of any of the subsequent duty cycles to bring one turbine from idle status up to power production.

Air Quality Modeling Results

The maximum predicted ambient impacts of the various modeling procedures described above are summarized in Table III for the averaging periods for which AAQS and PSD increments have been set.

Also shown in Table III are the corresponding significant ambient impact levels listed in Section 233 of the District's NSR Rule. In accordance with Regulation 2-2-414 further analysis is required for the one-hour NO₂ and the one-hour CO modeled impacts. Further analysis is not required for the eight-hour averaged CO modeled impacts.

TABLE III
Maximum predicted ambient impacts of proposed project (µg/m³)
[Overall maximum in bold type]

Pollutant	Averaging Time	Commissioning Maximum Impact	Startup Maximum Impact	Significant Air Quality Impact Level
NO ₂	1-hour	193	188	19
CO	1-hour	11,073	10,882	2000
	8-hour	483	495	500

Background Air Quality Levels

Regulation 2-2-111 of the NSR rule entitled PSD monitoring exemption, exempts an applicant from the requirement of monitoring background concentrations in the impact area (section 414.3) provided the impacts from the proposed project are less than specified levels. Table IV lists the applicable exemption standards and the maximum impacts from the proposed facility. As shown, all modeled impacts are below the preconstruction monitoring threshold.

TABLE IV
PSD monitoring exemption levels and maximum impacts
from the proposed project for NO₂ and CO (µg/m³)

Pollutant	Averaging Time	Exemption Level	Maximum Impacts from Proposed Project
CO	8-hour	575	495

The District-operated San Jose 4th Street Monitoring Station was chosen as representative of the background CO and NO₂ concentrations. Table V contains the concentrations measured at the three sites for the past 5 years (1999 through 2003).

TABLE V
Background NO₂ and CO concentrations (µg/m³) at San Jose 4th Street Monitoring for the past five years
(maximums are outlined)

	NO ₂	CO
Year	Highest 1-hour average	Highest 1-hour average
1999	249	10,267
2000	211	9,800
2001	211	8,867
2002	153	6,183
2003	173	6417

Table VI contains the comparison of the ambient standards with the proposed project impacts added to the maximum background concentrations. The National and California ambient NO₂ and CO standards are not exceeded from the proposed project. Therefore, in accordance with subsection 414.1, only a visibility, soils and vegetation impact analysis is further required.

TABLE VI
California and national ambient air quality standards and
ambient air quality levels from the proposed (µg/m³)

Pollutant	Averaging Time	Maximum Background	Maximum Project impact	Maximum Project impact plus maximum background	California Standards	National Standards
NO ₂	1-hour	249	193	442	470	---
CO	1-hour	10,267	11,073	21,340	23,000	40,000

VISIBILITY, SOILS AND VEGETATION IMPACT ANALYSIS

Visibility impacts were assessed using EPA's VISCSCREEN visibility screening model. The analysis shows that the proposed project will not cause any impairment of visibility at Pinnacles National Monument or Point Reyes National Seashore, the two nearest Class I areas.

Vegetation and soils in the project study area were inventoried. Maximum project NO₂ and CO concentrations will not result in significant soil and/or vegetation impacts.

CONCLUSIONS

The results of the air quality impact analysis indicate that the proposed project would not interfere with the attainment or maintenance of applicable AAQS for NO₂, and CO. The applicant's analysis was based on EPA approved models and calculation procedures and was performed in accordance with Section 414 of the District's NSR Rule.